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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/761,217	ARAKAWA, HIROSHI	
	Examiner	Art Unit	
	Eugenia Wang	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1, 3, 6, 8, and 9-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3, 6, 8, and 9-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 23, 2007 has been entered.

Response to Amendment

2. In response to the amendment received August 23, 2007:

a. Claims 2, 4, 5, and 8 have been cancelled as per Applicant's request.

Claims 1, 3,6, 7, and 9-12 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1, 3, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/016554 (Nemoto et al.) as evidenced by US 2002/0102458 (Maleki et al.).

As to claims 1, 3, and 6, Nemoto et al. teach a lithium secondary battery that has a pressure release valve at the end portion of the battery as a safety mechanism for preventing accidents caused from the rise of a battery's internal pressure due to evaporation of electrolyte solution in the case where the battery temperature rises by over-charging or over-discharging (as applied to claims 1 and 3) (para 0141). Figure 14(a) and 14(b) show the ends of the battery. Groove [85] in figure 14(a) acts as a pressure release valve, since it is torn due to mechanical weakening caused by the rising internal pressure, thus releasing the internal pressure (para 142, lines 6-16). In figure 14(b), metal foil [83], which covers hole [86] bursts to release internal pressure making it a pressure release valve as well (para 0143). It is inherent that these pressure release valves would only open when internal pressure of the battery reached a certain pressure that can be preset (as applied to claims 1 and 3). This pressure check system that starts when battery over-charging commences inherently would release the internal pressure (in the form of evaporated electrolyte solution) before an internal short-circuit occurs (as applied to claim 1).

Although Nemoto et al. does not specifically internal pressure, over-charging/discharging, and a temperature rise to an internal short circuit (as claimed by claim 1 of the instant application), a relationship between the aforementioned conditions

inherently exists, as evidenced by Maleki et al. Maleki et al. talks about Li-ion batteries under abusive conditions, with the abusive conditions being short circuit (thus encompassing internal and external), over-charging, over-discharging, and operation at high temperatures (para 0005). These abusive conditions release combustive gases (note gas release is synonymous with rising internal pressure within a given system) (para 0005). Thus, over-charging/discharging as well as short circuit both result in an increase of internal pressure within a battery system. Therefore, the battery of Nemoto et al. activates the safety mechanism 10 seconds before an inside short-circuit occurs, as the purpose of the safety valve is to prevent such abusive condition, and thus cases where Nemoto et al.'s battery vents without short-circuiting would inherently exist.

Furthermore, the battery of Nemoto et al. would at least be capable of activated ten seconds or more before an inside short-circuit occurs, as the pressure at which venting occurs is controllable. Thus, by venting at a pressure lower than that indicative of a short circuit would prevent short circuiting, and thus have the safety mechanism activate before the internal short-circuit occurs.

It has been held that the recitation of an element is "capable" of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson,* 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art

structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Additionally, the battery structure in Nemoto et al.'s invention can be applied to batteries used as a motor driving power source, such as an electric vehicle or a hybrid electric vehicle (para 0053, lines 15-19) (as applied to claim 6).

The difference between the teachings of Nemoto et al. and claim 1 is that Nemoto et al. do not teach that the amount of electrolytic solution provided to a lithium ion secondary battery is equal to or larger than the amount shown by the inflection point.

However, the optimum amount electrolytic solution to be used is a result effective variable based on the rate of gas decomposition and the internal space of the battery.

Discovery of optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955))

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to alter the result effective variable of the amount of electrolytic solution provided in order to optimize the amount provide with respect to the space available inside the battery and the decomposition rate of the electrolytic solution.

3. Claims 7, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nemoto et al. in view of US6696197 (Inagaki et al.), as evidenced by Maleki et al.

As to claims 7 and 9 Nemoto et al. teach a lithium secondary battery that has a pressure release valve at the end portion of the battery as a safety mechanism for preventing accidents caused from the rise of a battery's internal pressure due to evaporation of electrolyte solution in the case where the battery temperature rises by over-charging or over-discharging (as applied to claims 7 and 9) (para 0141). Figure 14(a) and 14(b) show the ends of the battery. Groove [85] in figure 14(a) acts as a pressure release valve, since it is torn due to mechanical weakening caused by the rising internal pressure, thus releasing the internal pressure (para 142, lines 6-16). In figure 14(b), metal foil [83], which covers hole [86] bursts to release internal pressure making it a pressure release valve as well (para 0143). It is inherent that these pressure release valves would only open when internal pressure of the battery reached

a certain pressure that can be preset (as applied to claims 7 and 9). This pressure check system that starts when battery over-charging commences inherently would release the internal pressure (in the form of evaporated electrolyte solution) before an internal short-circuit occurs (as applied to claim 7).

Although Nemoto et al. does not specifically internal pressure, over-charging/discharging, and a temperature rise to an internal short circuit (as claimed by claim 1 of the instant application), a relationship between the aforementioned conditions inherently exists, as evidenced by Maleki et al. Maleki et al. talks about Li-ion batteries under abusive conditions, with the abusive conditions being short circuit (thus encompassing internal and external), over-charging, over-discharging, and operation at high temperatures (para 0005). These abusive conditions release combustive gases (note gas release is synonymous with rising internal pressure within a given system) (para 0005). Thus, over-charging/discharging as well as short circuit both result in an increase of internal pressure within a battery system.

The differences between the teachings of Nemoto et al. and claims 7-9 is that Nemoto et al. do not teach that (a) the amount of electrolytic solution provided to a lithium ion secondary battery is equal to or larger than the amount shown by the inflection point (as required by claim 7) and (b) the safety mechanism used to discharge the decomposition gas has an underlying basis of two times the first time is from overcharging to discharging and the second time is from overcharging to inside short-circuiting (as applied to claims 7 and 9), with the difference between the two times being ten seconds or more (as applied to claim 7).

As to (a), the optimum amount electrolytic solution to be used is a result effective variable based on the rate of gas decomposition and the internal space of the battery. Discovery of optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955))

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to alter the result effective variable of the amount of electrolytic solution provided in order to optimize the amount provide with respect to the space available inside the battery and the decomposition rate of the electrolytic solution.

As to (b), Inagaki et al. teaches the fact that the electrolyte (electrolytic solution) can be ignited by an internal short-circuit (col. 13, lines 15-23). Therefore the gas decomposed from the electrolytic solution is flammable as well.

The motivation for venting the decomposed gas prior to short-circuiting, as taught by Nemoto et al., is to prevent this situation. In order to do this, the two aforementioned times must be found, and the difference between the two times provide the amount of time between the two provide the time that is available for venting, which can be used to ensure the completion of venting before short-circuiting (i.e. 10 seconds or more, as claimed by the instant application). Ignition is thus a result effective variable based on the two previously mentioned times.

The applicant shows that the longer the time period between the difference of the two aforementioned times, the less likely ignition will occur. This relationship is what would be expected, as Ingaki et al. mentions the flammability of the electrolytic solution. Discovery of an optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955)) It is also important to reiterate that internal pressure is directly affected by over-charging and increases due to the evaporation of the electrolytic solution (as applied to claim 9) (Nemoto et al., para 0141). Therefore the pressure at which the safety valve is preset to open can be calculated with respect to the difference between the two aforementioned times.

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to base the activation of the battery's safety mechanism on the two aforementioned times (including their application to internal pressure) in order to prevent ignition of the decomposition gas.

As to claim 11, the difference between the teachings Nemoto et al. and Inagaki et al. do not explicitly teach that the amount of electrolytic solution provided to a lithium ion secondary battery based on the difference between the first and second time. However, the amount of electrolytic solution that can be provided to the battery is inherently dependent on the amount of internal space of the battery, the rate of gas decomposition, and the opening of the safety valve. The safety valve (as taught by Nemoto et al.) is pressure dependent, which not only indicates the amount of gas

decomposition but also relates to the difference between the first and second time (see rejection for claim 9). Since the discharge of decomposition gas can be linked to the amount of space in the battery and the pressure inside the battery, a relationship can be drawn between the difference between the first and second time and the amount of electrolytic solution that can be supplied to it.

4. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nemoto et al. in view of Inagaki et al., as evidenced by Maleki et al., as applied to claims 7 and 9 above, and in further view of US 6437542 (Liaw et al.).

The teachings of Nemoto et al. and Inagaki et al. as applied to claims 7 and 9 have been discussed above and are herein incorporated.

The difference between claims 10 and 12 and the teachings Nemoto et al. and Inagaki et al. is that charging current is not a basis for the preset pressure of the safety mechanism (as applied to claim 10) or for the amount of electrolytic solution provided to the lithium ion secondary battery (as applied to claim 12).

Liaw et al. teaches that internal pressure can have multiple dependencies including **time**, operating temperature, ambient pressure, voltage range, **current level**, charge inputs (col 2, lines 19-26). Time has already been established as a variable that affects both preset pressure and electrolytic solution amount (see rejections for claims 9 and 11, respectively). Since none of the aforementioned variables are asserted to be more critical than another, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to preset the pressure and to provide a certain amount of electrolytic solution (as applied to claims 10 and 12, respectively)

using any of the aforementioned variables (current level, in this case) in order to safely vent the battery before short circuiting and in order to provide the necessary amount of electrolytic solution needed by the battery.

Response to Arguments

5. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

The argument with respect to Nemoto et al. not teaching the relationship between over-charging/over-discharging, internal pressure, and inside (internal) short-circuit is moot with the addition of the evidentiary piece.

However Examiner would like to take some time to address some of the arguments that would still be pertinent to the rejection.

Applicant argues that Inagaki teaches a sheet that absorbs leaking electrolyte and thus does not suggest or motivate the control duration between the occurrence of an inside short-circuit and activation time of a safety mechanism.

Examiner respectfully disagrees. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, although Inagaki et al. is not specifically drawn to venting, it

talks about electrolyte leaking and the fact that ignition takes place due to an internal short-circuit. Nemoto et al. teaches about venting evaporated electrolyte. One of ordinary skill in the art would be able to ascertain that the electrolyte (even in its evaporated form, as taught by Nemoto et al.) is flammable in the presence of an internal short-circuit. Therefore, ridding the evaporated electrolyte (through venting, as taught by Nemoto et al.) before an internal short circuit occurs (to prevent the electrolyte from catching on fire, a fact taught by Inagaki et al.) would be obvious to one of ordinary skill. Such a time difference would be a result effective variable based off of venting and short-circuiting to avoid ignition, as stated above. Further more, Examiner would like to note that Applicant has not set forth the fact that the time difference of 10 seconds is critical or unexpected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugenia Wang whose telephone number is 571-272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EW

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER